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STUDIES ON THE FORMOL AND WASSERMANN REACTIONS

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Recently Gaté and Papacostas¹ reported a new reaction of syphilitic serum. According to these authors, positive serums gel under the influence of formol while negative serums remain fluid. It was of interest to study this reaction on account of the simplicity of technic and its excellent results. We have followed the exact method applied by the authors with this difference, that the readings were taken after the lapse of 40 to 48 hours instead of 24 to 30 hours, because negative reactions have been observed to become positive at the end of 40 hours. In one instance (a positive case) complete coagulation of the serum was observed in 10 minutes following the addition of the reagent. This is exceptional because ordinarily the reaction is slow. We have also noted, in certain serums, following addition of formol, an increased viscosity with flocculation but without the formation of a gel; the mixture remains semifluid so that it runs along the side of the inclined tube. These false or doubtful positives will be referred to subsequently. Tubes and pipets used in this reaction should be dry and tubes containing the serum and formol should be well stoppered. The reason for this will be found in some experiments to be discussed.

The following table gives the results of the Wassermann and formol reactions in 174 serums of suspicious cases.

We obtained positive formol reactions in 67% of cases of malignant tumors which gave negative Wassermann reactions. We have, therefore, a higher percentage of positive reactions among patients with malignant tumors than among syphilitic patients. The serum of a woman, taken 8 days after the extirpation of a sarcoma of the neck, reacted only moderately. We were unable to obtain serum of this case subsequently. The serums of pregnant women (7 to 9 months) always gave a negative formol reaction.

Serums of normal dogs, rabbits, guinea-pigs, hogs, etc., were always negative, but often positive in pathologic conditions. In cases of dogs, 28% positive reactions were obtained, and this was practically constant

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¹ Compt. rend. Soc. de biol., 1920, 83, p. 1432.

in tenia infestations. In rabbits affected with coccidiosis of the peritoneal cavity, 34% gave a positive reaction, while 100% positive reactions were obtained if the spleen harbored coccidia or other parasites. A rabbit with hydatid cysts also gave a positive reaction.

Formol positive serums are rendered negative by dilution with water to more than 1:5 or 1:6. Dilution of the serum leads to the development of false positives in which there is increased viscosity with flocculation. Concentration of serums to $\frac{3}{4}$ or $\frac{4}{5}$ their original volume (depending on the species of animal) changes negative serums so that they give positive reactions.

TABLE 1
RESULTS OF WASSERMANN AND FORMOL TESTS

Wassermann Reaction	Formol Reaction			
41 strongly positive.....	<table><tr><td>11 positive</td></tr><tr><td>4 doubtful</td></tr><tr><td>26 negative</td></tr></table>	11 positive	4 doubtful	26 negative
11 positive				
4 doubtful				
26 negative				
6 weakly positive.....	<table><tr><td>1 positive</td></tr><tr><td>1 doubtful</td></tr><tr><td>4 negative</td></tr></table>	1 positive	1 doubtful	4 negative
1 positive				
1 doubtful				
4 negative				
127 frankly negative.....	<table><tr><td>5 positive</td></tr><tr><td>1 doubtful</td></tr><tr><td>121 negative</td></tr></table>	5 positive	1 doubtful	121 negative
5 positive				
1 doubtful				
121 negative				

It seems to us fair to conclude that the formol reaction is not due to some specific substance but to a relative increase of the usual constituents of normal serum, possibly globulins. As is well known, various authors have shown that an increase of globulins in syphilis and malignancy exists.

While our work was under way, Pauzat² reported results entirely different from those of Gaté and Papacostas, and more recently Ecker³ also obtained results identical with those of Pauzat and ourselves.

² Ibid., 1921, 84, p. 503.

³ Jour. Infect. Dis., 1921, 29, p. 359.